Proposed Synopsis
on

PHARMACOGNOSTIC, PHYTOCHEMICAL AND PHARMACOLOGICAL EXPLORATION OF SOME MEDICINAL PLANTS

Submitted to

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,

NANDED

For Doctor of Philosophy

In Subject of

PHARMACY

Under the faculty

PHARMACEUTICAL SCIENCE & TECHNOLOGY

By

Mr. Patrakar Ramling Gangadhar

M. Pharm.

Research Supervisor

Prof. (Dr.) Namdev Y. Gond

Professor & Head

Dept of Pharmacognosy

CENTER FOR RESEARCH IN PHARMACEUTICAL SCIENCES (CRPS)

SSBES's

Nanded Pharmacy College

Shyam Nagar, Nanded- 431605

2016

INTRODUCTION:

The history of herbal medicine is as old as human civilization. In the past, almost all medicines used were from the plants. Medicinal plants have been used in traditional systems of medicines for treatment of various disorders. It is estimated that 70-80% of people worldwide depends on traditional herbal medicine to for first-line and basic health service. Medicinal plants are important for pharmacological research and drug development because plant constituents are not only used directly as therapeutic agents, but also as starting materials for the synthesis of drugs or as models for pharmacologically active compounds. Herbal-derived remedies need a powerful and deep assessment of their pharmacological qualities and safety issues due to the large and growing use of natural-derived substances all over the world, which cannot rely only on the traditional knowledge. Plants are used medicinally in different countries and are a source of many potent and powerful drugs. In India, the herbal remedy is so popular that the Government of India has created a separate department - AYUSH - under the Ministry of Health & Family Welfare. The National Medicinal Plants Board was also established in 2000 by the Govt. of India in order to deal with the herbal medical system. India has rich source of medicinal plants, which includes more than 2000 species and high potential but only few have been studied chemically and pharmacologically for their potential medicinal value, these plants obviously requires evaluation on modern scientific lines such as phytochemical and pharmacological screening etc. The present study will undertake **"Pharmacognostic, Phytochemical and Pharmacological exploration of some medicinal plants"** from Maharashtra as this region has tremendous diversity of medicinal plants which will provide scientific data on selected medicinal plant.

RESEARCH PROBLEM:

Herbs are natural products and their chemical composition varies depending on several factors, such as botanical species, used chemo types, the anatomical part of the plant used (seed, flower, root, leaf) and also storage, sun, humidity, type of ground, time of harvest, geographic area which finds difficulty in pharmacognostic as well as pharmacological evaluation of medicinal plant.Although governments, international agencies, and corporations are increasingly investing in herbal medicine research, numerous challenges about the safety and efficacy of herbal use remain unaddressed in this field.

A) Proposed investigation will provide:

i) Pharmacognostic information of selected medicinal plant.

ii) What type of Phytochemicals are present different types of extracts of selected medicinal plant?

iii) The scientific data on selected medicinal plant will be prepared, so it will serve as a source of information to provide all idea about current trends in research of the herbal plants.

iv) Does the selected plant possess medicinal properties claimed by traditional system of medicine or by tribal people will be confirmed.

v) It is crucial to get knowledge of medicinal plants in terms of toxicity, safety which is generally neglected so toxicity study will be undertaken.

B) Need for investigation:

a) Now a day the world trend is toward the utilization of medicinal plants to treat various ailments.

b) Several plants possess potential therapeutic properties and the claims of many medicinal plants used in traditional medicine are now supported by scientific study.

c) Pharmacognostic studies ensure plant identity, lays down standardization parameters which will help and prevents adulterations. Such studies will help in authentication of the plants and ensures reproducible quality of herbal products which will lead to safety and efficacy of natural products.

d) The problem of Plant-based treatment is the lack of definite and complete information about the composition of extracts.

e) Evidence for the potential therapeutic effects of selected herbs is generally provided based on experiments demonstrating a biological activity, thus pharmacological evaluation of medicinal plant confirms its potency.

f) Plant derived remedies need a powerful and deep assessment of their pharmacological qualities and safety that actually can be realized by pharmacological evaluation.

g) The side effects and expensiveness issues associated with synthetic drugs have developed interest for research in to medicinal plants which are generally without side effect, especially those belonging to traditional system of medicine.

h) The survey reveals that treatment of many disease are still need holistic approach as no effective measures are available in modern medicine so far, herbal drugs used in Indian system of medicine are however claimed to be effective and safe in such ailments like liver disorder, lipid disorder, obesity etc.

LITERATURE REVIEW:

- Rajani Srivastava (2014) given the review to understand the information available on the botany, traditional uses, Phytochemistry, Pharmacology of *Wrightia tinctoria* to explore its therapeutic potential and future research opportunities.
- Devendra Pratap Singh *et al* (2013) studied Pharmacognostic profile of the plant like Macroscopic, Microscopical, Physicochemical investigation such as LOD, Ash value, Extractive value etc.
- S Ramachandra Setty *et al* (2010) determined the Pharmacognostical, physicochemical and phytochemical parameters as standardization markers for *Hibiscus micranthus* Linn. The macroscopic and microscopic characters, physical constant values, extractive values, ash values, micro chemical analysis and fluorescence analysis were performed. Chemomicroscopic characters like lignin, starch, suberin, mucilage, cellulose, protein bodies and calcium oxalate crystals were investigated. Fluorescence studies of the powder were carried in ordinary light and UV light with various solvents. Phytochemical screening of successive extracts was performed to investigate various phytochemicals in the plant. The extracts were also subjected for TLC, *HPTLC Fingerprinting Analysis as well as* the total flavonol content of the extract was determined by aluminum chloride colorimetric method.
- H. J. Dhongade, A.V. Chandewar (2013) studied Morphological and pharmacognostical properties like transverse section, Leaf constants such as palisade ratio, stomatal number, stomatal index, vein islet number, and vein termination number were studied. Physical constants like ash value, extractive value, moisture content, swelling index was also studied.
- Sunita Dalal *et al* (2014) developed the high performance thin layer chromatography (HPTLC) finger print profile of methanol and ethyl acetate extracts of leaves of Cassia fistula. Chromatographic technique was usedfor separation of components from different extracts of leaves. This study was planned to develop a HPTLC fingerprint profile of extracts in different solvents such as petroleum ether, toluene, ethyl acetate, chloroform,

acetone and formic acid. HPTLC profiling of the extract confirm about the presence of various phytochemicals. This study helps in qualitative, quantitative analysis and serves as a tool for standardization of the extract. Different Rf value of various phytochemicals provide valuable clue regarding their polarity and selection of solvents for separation of phytochemicals.

- Karthika K, Jamuna S, Paulsamy S (2014) in this study the chemical fingerprint is established through TLC and HPTLC analyses for various secondary metabolites in present in *Solena amplexicaulis* tubers. The TLC and HPTLC studies were carried out as per the methods of Harborne and Wagner *et al.* The profiles of various individual secondary metabolites were made and developed for authentication. The methanolic tuber extract showed the presence of 5 alkaloids, 6 flavonoids, 2 glycosides, 10 saponins and 7 terpenoids. The development of such fingerprint can be used in differentiation of the species from the adulterant in terms of phytochemical constituents and hence act as biochemical markers in the pharma industry and plant systematic studies.
- Thara K. M and K. F. Zuhra (2012) discussed various *In-vitro* methods for pharmacological evaluation of medicinal plants such as Antioxidant assay (DPPH Assay, Reducing power method), Anticancer Assay (MTT Assay), Cytotoxicity Assay (Trypan blue exclusion method), Antimicrobial Assay etc.
- J.V. Castell and M.J.Gomez- Lechon (1997) providedcomprehensiveinformation to laboratory techniques for evaluating in vitro organ toxicity using cellular models. It gives practical tips on how to perform and interpret assays for drug metabolism and toxicity assessment are provided, along with a comparison of different techniques available.

Many ethno medicinal survey on medicinal plants used by local inhabitants of various regions of Maharashtra state such as Western Maharashtra, Khandesh, Marathwada and Vidharbha shows that Maharashtra has rich heritage of medicinal plants. The hilly ranges and forests of Maharashtra contain valuable ethno medicinal plants which have been used by traditional healers such as `Vaidya` and `Hakims`for treatment of various diseases, plant from this region will be selected and investigated for its Pharmacognostical, Phytochemical and Pharmacological properties. Accordingly for present study following medicinal plants such as *Merremia dissecta, Volutarella divaricata, Ehretia aspera,*

Jacaranda acutifolia, Morus indica, Clerodendron infortunatum, Paeonia officinalis, Dolichandrone falcate, Cochlospermum religiosum, Gantelbua urens etc will be shortlisted and two to three medicinal plants will be selected for further studies.

OBJECTIVE OF STUDY

a) Selection of the plants
b) Authentication of plants
c) Pharmacognostic evaluation of plants
d) Preliminary phytochemical investigation of plants
e) Isolation and characterization of phytoconstituents(s)
f) Screening of plant extracts for its pharmacological activities

PLAN OF WORK

1. **Literature review**
2. **Selection, Collection and Authentication of plant material**
3. **Processing of crude drug**
4. **Pharmacognostic evaluation of plant material**
5. **Extraction of plant material**
   a) Selection of extraction method
   b) Selection of solvent
6. **Phytochemical evaluation**
   a) Preliminary phytochemical screening
   b) Physicochemical analysis
   c) Qualitative analysis of extracts by HPTLC / TLC fingerprinting
   d) Isolation and characterization of phytoconstituents.
7. **Pharmacological Screening of plant extracts for-**
   a) Toxicity study.
   b) Pharmacological screening of plants extracts.
8. **Interpretation of data and its presentation**

MATERIALS AND METHODS:

a) **Literature survey (3-4 Months):** This will include detailed survey of selected plant habit and habitat, collection of required literature, information related to scientific work carried out and its traditional uses.

b) **Selection, collection and authentication of plants (2-3 Months):** Plants will be shortlisted from the mentioned plants; two to three will be selected and collected on the basis of literature survey and ethno pharmacological claims. The selected plant will be authenticated from expert and processed for further investigation.

c) **Processing of crude drug (2-3 Months):** Collected plant species will be processed and made suitable for extraction.

d) **Pharmacognostic evaluation (4-5 Months):** The Pharmacognostic evaluation of selected plant will be carried out which includes morphological evaluation, microscopic evaluation, and physicochemical evaluation.

e) **Extraction of plant material with various solvents (2-3 Months):** Selected plant parts will be subjected to suitable extraction methods. The choice of solvent for extraction & method will be decided according to nature of phytochemical constituents of selected plant parts.

f) **Phytochemical evaluation of plant extracts and isolation of phytoconstituents (6-8 Months):** The obtained extracts will be subjected for preliminary phytochemical investigation. Qualitative analysis and standardization will be carried out for detection and quantization of phytoconstituents by possible standard methods. Isolation and characterization of phytoconstituents(s) will be carried out.

g) **Pharmacological evaluation(7-8 Months):**

The extract will be subjected for pharmacological screening according to phytochemical profile and ethno botanical claims.

i) **Toxicity studies:** The toxicity study will be carried out as per guidelines given by Organization for Economic Co-operation and Development (OCED-423).

ii) **Evaluation for pharmacological activity:** The obtained extracts will be screened for pharmacological potential using suitable method(s).

h) Interpretation of data and its presentation(3-4 Months):

- **Result:** The results obtained will be displayed through various tables, charts, photographs, graphs, bar diagrams and other records. Results shall be statistically analysed to reveal the level of their significance.
- **Discussion:** On the backgrounds of literature reviews and the results obtained by the proposed work, the result shall be discussed for all sorts of scientific as well as proven possibilities and suitable conclusion shall be drawn.
- **Conclusion:** These will be drawn from the discussion of experimental outcome, results obtained and author`s own opinions on performed work.
- **Bibliography:** A complete list of all the relevant references shall be attached at the end of the dissertation. The dissertation will be written as per instruction and guidelines provided by the university.

Importance of study/ applications to society:

i) Natural resources of medicinal plants are ubiquitous in Maharashtra, which can be scientifically explored and established to develop new medicine of herbal origin.

ii) Efficacy and safety of an herbal remedy will be made available to the society.

iii) Herbal drug development will generate new resources for cultivating selective herbal varieties.

iv) Plants have been established as potential source for phytoconstituents with varied pharmacological activities. Identification of such plants of potential use in medicine will be of great significance for further drug development.

4. BIBLIOGRAPHY:

- Deshmukh BS., Ex-situ conservation studies on ethno- medicinal rare, endemic Plant species from Western Ghats of Maharashtra.International Journal of Pharma and Bio Sciences, 2010; 1(2):1-6.
- Fabio Firenzuoli, Luigi Gori. Herbal Medicine Today: Clinical and Research Issues. Evid Based Complement Alternat Med, 2007 Sep; 4(Suppl 1): 37–40.
- H. J. Dhongade, A.V. Chandewar. Pharmacognostical and Phytochemical studies of *Phyllanthus amarus* leaves. IJBAR, 2013; 04 (06):382-389.
- J.V. Castell and M.J.Gomez- Lechon. In Vitro Methods in Pharmaceutical Research. Elsevier Science Publishing Co Inc, San Diego, United States. 1997.
- K Ashok Kumar, S Ramachandra Setty and Laxmi Narsu. Pharmacognostic and phytochemical investigations of roots of *Hibiscus micranthus* Linn. RJPBCS, 2010; 1(4):324-337.
- Kachare SV, Raut KS, Surywanshi SR., Medicinal plants used by local inhabitants in Marathwada. International Journal of Current Research, 2010; 4: 049-051.
- Kala Chandra Prakash, "Revitalizing Indian systems of herbal medicine by the National Medicinal Plants Board through institutional networking and capacity building". *Current Science*, 2007; **93** (6): 797–806.
- Karthika K, Jamuna S, Paulsamy S. TLC and HPTLC Fingerprint Profiles of Different Bioactive Components from the Tuber of *Solena amplexicaulis*. Journal of Pharmacognosy and Phytochemistry, 2014; 3 (1): 198-206.
- Khandelwal KR. Practical Pharmacognosy Techniques and Experiments. 3rd edition, Nirali Prakashan, Pune, 1996.
- Kokate CK. Practical Pharmacognosy. 4th edition, Vallabh Prakashan, New Delhi, 1994.
- Ladda RG, Aradwad RP, Ambhore JS., Studies on herbal medicinal plants in Marathwada region (MS) India.Bioscience Discovery, 2013;4(2):211-213.
- Leena Seasotiya, Priyanka Siwach, Anupma Malik, Sheema Bai, Pooja Bharti, Sunita Dalal. Phytochemical evaluation and HPTLC fingerprint profile of Cassia fistula. IJAPBC, 2014; 3(3):604-611.

- Li JW, Vederas JC., Drug discovery and natural products: end of an era or an endless frontier? Science, 2009 Jul 10; 325(5937):161-165.
- Nadeem M, Dandiya PC. Hepatoprotective activity of some herbal formulation available in India. Indian Drugs, 1996; 33(8): 390-95.
- Organization for Economic Co-operation and Development [OCED], Guidelines documents on acute oral toxicity testing, Environmental Directorate, Paris, 2001.
- Patil SH, Yadav SS., Traditional Medicinal Plants of Satpuda, Nandurbar District, Maharashtra State.The Indian Forester,2003; 129(11):1-7.
- Rajani Srivastava. A review on phytochemical, pharmacological, and pharmacognostical profile of *Wrightia tinctoria*: Adulterant of kurchi. Pharmacognosy Review, 2014; 8(15):36-44.
- Robert AT. Screening Methods in Pharmacology, Academic Press, New York & London, 1965.
- Shilpi Arora, Devendra Pratap Singh, Ankit Saini, Ashish Kumar. Pharmacognostic investigation on roots & leaves extract of *abutilon indicum linn. Int. J. Res. Dev. Pharm. L.Sci.*, 2013; 2(5): 567-573.
- Sumitra Chanda, Importance of pharmacognostic study of medicinal plants: An overview. Journal of Pharmacognosy and Phytochemistry, 2014; 2 (5): 69-73.
- Thara K. M and K. F. Zuhra. Comprehensive *In-vitro* pharmacological activities of different extracts of *Saussurea lappa.* European Journal of Experimental Biology, 2012; 2 (2):417-420.
- V. R. Deshmukh, S. P. Rothe., Exotic medicinal plants from west vidarbha region. Biolife, 2013; 2(1): 387-391.
- WHO (World Health Organization): *WHO traditional medicine strategy 2002–2005*. Geneva: World Health Organization; 2002.
- WHO. Quality Control Methods for Medicinal Plant Materials. World Health Organization, Geneva, 1999.

Name & signature of Research Scholar **Name & signature of Supervisor**
(Mr. R G PATRAKAR) **(Dr. N. Y. GOND)**